

Jean, the 18th tropical cyclone of 1977, established two season records; first, as the shortest-lived typhoon of the season and second, as the only tropical cyclone of 1977 for which a formation alert was not issued prior to the initial warning. Jean was first observed on satellite imagery as a weak disturbance located some 200 nm (371 km) south-east of Kwajalein Atoll at 2128Z on the 24th of October. While moving northwestward at 14 kt (26 km/hr), the disturbance was included on JTWC's Significant Tropical Weather Advisory (ABEH PGTW) for the next several days. Located downstream of an upper tropospheric trough axis in a diffluent area aloft, the disturbance was in a favored position for development. By 1200Z on the 27th, an upper tropospheric outflow center (200 mb) was analyzed over the surface position further supporting development.

Due to the presence of a ship in close proximity to the cyclone, the initial warning on Tropical Depression 18 was issued at 1200Z on the 28th with an intensity of 30 kt (15 m/sec) and a northwest movement at 14 kt (26 km/hr). Satellite data over the next 6 to 12 hours indicated an intensity increase and at 1800Z on the 28th the depression was upgraded to tropical storm status. At this same time, Jean was beginning to show a more northward trend and had slowed appreciably to a speed of 6 kt (11 km/hr). The more northward thence north-northeastward track was attributed to upper- and mid-tropospheric level steering influences which were dominant above the easterly steering flow near the surface and in the lower troposphere. Because the steering currents at various levels were not acting in conjunction, a slowing trend in forward movement was noted.

At 0513Z on the 29th, reconnaissance aircraft penetrated the storm and observed surface winds near 60 kt (31 m/sec) and also reported that an eye was beginning to form. Satellite imagery at 0905Z on the 29th (Fig. 4-20) further supported the aircraft's observed intensification; consequently, at 1800Z on the 29th, Jean was upgraded to a typhoon. Satellite positioning also dictated a more north-northeastward track. Jean maintained minimum typhoon intensity for the next 6 hours through the 300000Z warning thereby establishing the aforementioned record as the shortest-lived typhoon of the season.

Post analysis revealed that beyond the 300000Z position Jean began to react to the effects of very strong vertical shear. At the surface and at low-tropospheric levels, steering flow was strong easterly around the southern periphery of the subtropical ridge. Steering flow at mid- and upper-tropospheric levels was strong west-southwesterly. Under this hostile regime, Jean began to weaken and had made her furthest northeastward incursion by 1200 on the 30th with 55 kt (28 m/sec) intensity. Satellite data on the 30th showed an exposed low-level circulation center to the west of the area of major convective activity. Jean began to weaken rapidly and move west and then west-northwest in response to the east/east-southeasterly steering at low tropospheric levels. Figure 4-21 depicts

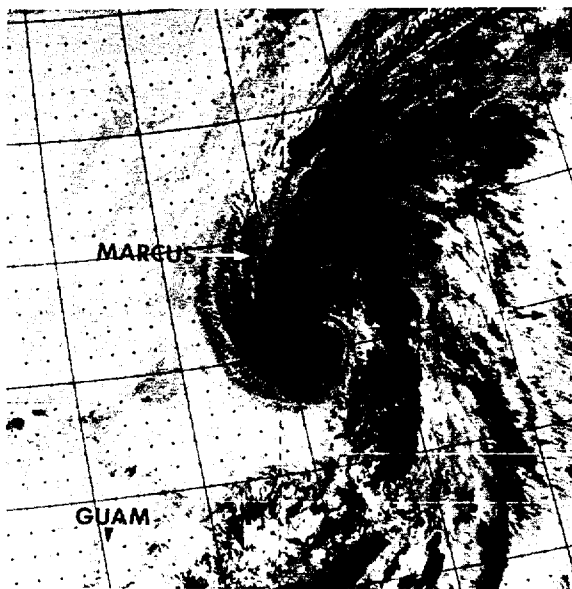


FIGURE 4-20. Infrared photograph of Jean at 55 kt (28 m/sec) intensity tracking north-northeastward, 29 October 1977, 0905Z. (DMSP imagery)

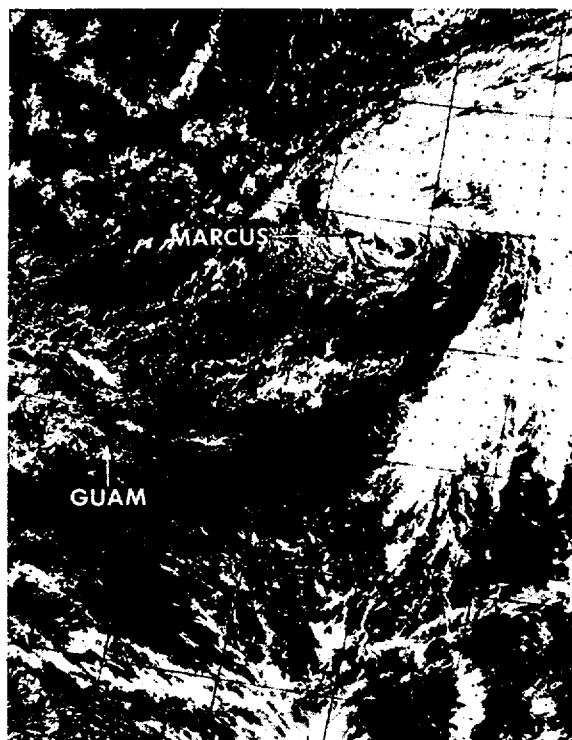


FIGURE 4-21. Exposed low level circulation of Tropical Storm Jean at 40 kt (21 m/sec) intensity during westward acceleration, 31 October 1977, 0102Z. (DMSP imagery)

the low level circulation center with the major convection sheared off to the east. Figure 4-22 is a graphic depiction of Jean's passage north of Marcus Island through three-hourly synoptic reports.

JTWC issued its expected final warning on TD 18 (formerly Tropical Storm Jean) at 1200Z on the 31st with a forecast dissipation within 12 hours. The low level circulation was closely monitored via satellite for signs of reintensification for the next 24-36 hours. By 2323Z on the 1st of November, the disturbance began to show an improved satellite signature with an increase in convective activity. TD 18 was reactivated and a warning was issued at 0000Z on the 2nd of November. At this time, TD 18 began meandering northward at 3 to 4 kt (5.5 to 7.5 km/hr)

and showed an intensity of 30 kt (15 m/sec). For the next 12 to 24 hours, the system executed a looping movement and by 1450Z on the 2nd satellite data again showed the effects of strong vertical shear with an exposed low level circulation again visible to the west of the main convection. Once sheared off, the low level circulation responded to low tropospheric, northeasterly flow around the southeastern periphery of a large anticyclone centered over the Sea of Japan. The final warning was issued at 031200Z with dissipation forecast by 031800Z. The low level circulation center continued tracking to the southwest and then west-southwest remaining weak and visible on satellite imagery until 0019Z on the 6th of November.

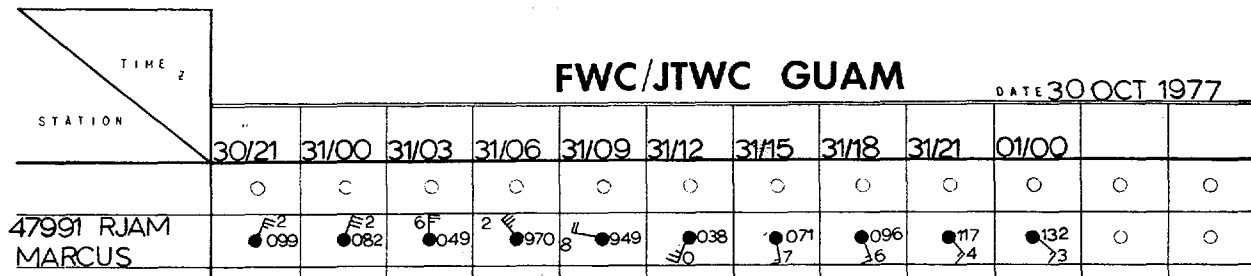


FIGURE 4-22. Three-hourly synoptic surface observations at Marcus Island during the passage of Jean.